

IN THE CLAIMS:

The following is a complete listing of the claims, reflects all changes currently being made thereto, and replaces all earlier versions and listings:

1.-2. (cancelled)

3. (previously presented): The image pickup apparatus according to Claim 28, wherein said photoelectric conversion unit includes an embedded photodiode.

4. (cancelled)

5. (previously presented): An image pickup device comprising:  
a plurality of pixels each including a photoelectric conversion unit, a semiconductor area to which a signal from said photoelectric conversion unit is transferred, a transfer switch to transfer the signal from said photoelectric conversion unit to said semiconductor area, and a read unit to read out the signal from said semiconductor area; and  
a drive circuit coupled to said pixels and to output a signal for controlling said transfer switch so that a time during which said transfer switch changes from an ON state to an OFF state becomes longer than a time during which said transfer switch changes from the OFF state to the ON state.

6. (previously presented): The device according to Claim 5, wherein said read unit includes an amplification transistor for amplifying and outputting the signal in said semiconductor area.

7. (previously presented): The device according to Claim 5, wherein said photoelectric conversion unit includes an embedded photodiode.

8. (previously presented): The device according to Claim 5, further comprising  
an analog/digital conversion circuit adapted to convert a signal from each of said plurality of pixels into a digital signal,  
a signal processing circuit adapted to process the signal from said analog/digital conversion circuit, and  
a recording circuit adapted to record the signal processed by said signal processing circuit.

9. (withdrawn):: An image pickup device comprising:  
a plurality of pixels each including a photoelectric conversion unit, a semiconductor area to which a signal from said photoelectric conversion unit is transferred, a transfer switch adapted to transfer the signal from said photoelectric conversion unit to said semiconductor area, and a read unit adapted to read out the signal from said semiconductor area;  
and  
a drive circuit adapted to control said transfer switch,

wherein a substantial driving force of said drive circuit for changing said transfer switch from an OFF state to an ON state is higher than a substantial driving force for changing said transfer switch from the ON state to the OFF state.

10. (withdrawn): A device according to Claim 9, wherein said read unit includes an amplification transistor for amplifying and outputting the signal in said semiconductor area.

11. (withdrawn): A device according to Claim 9, wherein said photoelectric conversion unit includes an embedded photodiode.

12. (withdrawn): A device according to Claim 9, further comprising  
an analog/digital conversion circuit adapted to convert a signal from each  
of said plurality of pixels into a digital signal,  
a signal processing circuit adapted to process the signal from said  
analog/digital conversion circuit, and  
a recording circuit adapted to record the signal processed by said signal  
processing circuit.

13. (withdrawn): An image pickup device comprising:  
a plurality of pixels each including a photoelectric conversion unit, a  
semiconductor area to which a signal from said photoelectric conversion unit is transferred, a  
transfer switch adapted to transfer the signal from said photoelectric conversion unit to said

semiconductor area, and a read unit adapted to read out the signal from said semiconductor area;  
and

a drive circuit adapted to control said transfer switch,

wherein said transfer switch comprises a transistor of a first conductivity type, and  
said drive circuit includes at least a structure formed by connecting the transistors of the first  
conductivity type in series.

14. (withdrawn): A device according to Claim 13, wherein said read unit  
includes an amplification transistor for amplifying and outputting the signal in said  
semiconductor area.

15. (withdrawn): A device according to Claim 13, wherein said photoelectric  
conversion unit includes an embedded photodiode.

16. (withdrawn): A device according to Claim 13, further comprising  
an analog/digital conversion circuit adapted to convert a signal from each  
of said plurality of pixels into a digital signal,  
a signal processing circuit adapted to process the signal from said  
analog/digital conversion circuit, and  
a recording circuit adapted to record the signal processed by said signal  
processing circuit.

17. (previously presented): An image pickup device comprising:

a plurality of pixels each including a photoelectric conversion unit, a semiconductor area to which a signal from said photoelectric conversion unit is transferred, a transfer switch to transfer the signal from said photoelectric conversion unit to said semiconductor area, and a read unit to read out the signal from said semiconductor area; and a drive circuit coupled to said pixels to output a signal to control said transfer switch so that a fall speed  $V_{\text{off}}$  for changing said transfer switch from an ON state to an OFF state has a relation  $10 V/\mu\text{sec} > V_{\text{off}}$ .

18. (previously presented): The device according to Claim 17, wherein said

read unit includes an amplification transistor for amplifying and outputting the signal in said semiconductor area.

19. (previously presented): The device according to Claim 17, wherein said

photoelectric conversion unit includes an embedded photodiode.

20. (previously presented): The device according to Claim 17, further

comprising

an analog/digital conversion circuit adapted to convert a signal from each of said plurality of pixels into a digital signal,

a signal processing circuit adapted to process the signal from said analog/digital conversion circuit, and a recording circuit adapted to record the signal processed by said signal processing circuit.

21. (withdrawn): An image pickup device comprising:

a plurality of pixels each including a photoelectric conversion unit, a semiconductor area to which a signal from said photoelectric conversion unit is transferred, a transfer switch adapted to transfer the signal from said photoelectric conversion unit to said semiconductor area, and a read unit adapted to read out the signal from said semiconductor area; and

a drive circuit adapted to control said transfer switch,  
wherein said drive circuit includes a constant current circuit.

22. (withdrawn): A device according to Claim 21, wherein said read unit includes an amplification transistor for amplifying and outputting the signal in said semiconductor area.

23. (withdrawn): A device according to Claim 21, wherein said photoelectric conversion unit includes an embedded photodiode.

24. (withdrawn): A device according to Claim 21, further comprising  
an analog/digital conversion circuit adapted to convert a signal from each of said plurality of pixels into a digital signal,  
a signal processing circuit adapted to process the signal from said analog/digital conversion circuit, and  
a recording circuit adapted to record the signal processed by said signal processing circuit.

25. (previously presented): A drive method for an image pickup device including a plurality of pixels each including a photoelectric conversion unit, a semiconductor area to which a signal from said photoelectric conversion unit is transferred, a transfer switch to transfer the signal from said photoelectric conversion unit to said semiconductor area, and a read unit to read out the signal from said semiconductor area, comprising:

an output step of outputting a first drive signal level at which said transfer switch is set in an OFF state, a second drive signal level at which said transfer switch is set in an ON state, a third drive signal level between the first drive signal level and the drive signal second level and the transfer switch is capable of transferring a part of the carrier in the photoelectric conversion unit based on the driving signal of the third drive signal level,

wherein the third drive signal level is held for a predetermined time while said transfer switch is changing from the ON state to the OFF state.

26. (previously presented): A drive method for an image pickup device including a plurality of pixels each including a photoelectric conversion unit, a semiconductor area to which a signal from said photoelectric conversion unit is transferred, a transfer switch to transfer the signal from said photoelectric conversion unit to said semiconductor area, and a read unit to read out the signal from said semiconductor area, comprising:

an output step of outputting a drive signal to control said transfer switch so that a time during which said transfer switch changes from an ON state to an OFF state becomes longer than a time during which said transfer switch changes from the OFF state to the ON state.

27. (previously presented): A drive method for an image pickup device including a plurality of pixels each including a photoelectric conversion unit, a semiconductor area to which a signal from said photoelectric conversion unit is transferred, a transfer switch to transfer the signal from said photoelectric conversion unit to said semiconductor area, and a read unit to read out the signal from said semiconductor area, comprising:

an output step of outputting a drive signal to control said transfer switch so that a fall speed  $V_{off}$  for changing said transfer switch from an ON state to an OFF state has a relation  $10 \text{ V/sec} > V_{off}$ .

28. (currently amended): An image pickup apparatus comprising:

a photoelectric conversion unit;

a transfer switch for transferring a carrier in the photoelectric conversion unit;

an amplifying unit for amplifying a signal based on the carrier and having an input unit which inputs the carrier transferred by the transfer switch;

a reset element for resetting the input unit, wherein the reset ~~unit~~ element resets the input unit when the reset unit is in an ON state; and

a driving circuit for driving the transfer switch,

wherein the driving circuit supplies the transfer switch with a driving signal having a level which is changed between a first level for changing the transfer switch into an OFF state, a second level for changing the transfer switch into an ON state, a third level intermediate between the first and second levels and the transfer switch is capable of transferring



a part of the carrier in the photoelectric conversion unit based on the driving signal of the third level from the driving circuit, and

wherein the driving signal of the third level is supplied to the transfer switch after termination of a storage period of the carrier in the photoelectric conversion unit, during a period of a transition of the driving signal from the second level into the first level, and while the reset element is an OFF state.